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Archaeology in Paradise (Park), Jamaica: Investigating Jamaica's two Pre-Columbian Cultures

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Paradise Park is located in southwest Jamaica between Ferris Cross and Savanna la Mar. There are two archaeological sites on the property in an undeveloped area fronting Bluefields Bay. The two sites are separated by 240 m with no intervening cultural materials. Excavations were conducted at both sites between 1998 and 2004. Paradise (Wes-15a) is a "Redware" site (Little River phase) radiocarbon dated to between cal AD 673-1428. There is a possible house area and dense midden containing abundant pottery, chert cobbles and flakes, marine mollusk shells (especially queen conch), fire-cracked limestone, and a faunal assemblage dominated by sea turtle bones. The Sweetwater site (Wes-15b) was occupied later (cal AD 1400 to post contact). The pottery at Sweetwater has a completely different paste, surface treatment, and is characterized by the Montego Bay variety of the White Marl phase. Pottery is abundant; chert is present in smaller quantities and smaller size flakes; fire-cracked limestone is less common, the mollusk assemblage is dominated by clams and mud conchs, and fish bones comprise 97% of the fauna with sea turtle completely absent. The two sites provide a unique opportunity to investigate differences in material culture in an essentially identical environmental setting. Descriptions of both sites, an overview of the excavations, and a review of the materials recovered are presented here for the first time. Special attention is given to the Paradise site because so few Redware sites have been excavated (only 3 of the 16 known), and the deposits are substantially deeper (about 60 cm) than the 10-25 cm reported for other Redware sites. Finally, the Paradise site offers the first evidence of interactions between Little River and White Marl "cultures."

Paradise Park est situé dans le sud-ouest de la Jamaïque entre Ferris Cross et Savanna la Mar. Il y a deux sites archéologiques sur la propriété dans une zone non aménagée en face de Bluefields Bay. Les deux sites sont séparés par 240 m sans matériel culturel intermédiaire. Des fouilles ont été menées sur les deux sites entre 1998 et 2004. Paradise (Wes-15a) est un site « Redware » (phase de Little River) au radiocarbone daté entre 673 et 1428 après JC. Il y a une zone de maison possible et un milieu dense contenant des poteries abondantes, des pavés et des flocons de chert, des coquilles de mollusques marins (en particulier des conques reines), du calcaire fissuré et un assemblage faunique dominé par des os de tortues de mer. Le site de Sweetwater (Wes-15b) a été occupé plus tard (cal 1400 après JC pour poster le contact). La poterie de Sweetwater a une pâte complètement différente, un traitement de surface et se caractérise par la variété Montego Bay de la phase de marne blanche. La poterie est abondante ; chert est présent en plus petites quantités et en flocons de plus petite taille ; le calcaire fissuré est moins commun, l'assemblage de mollusques est dominé par les palourdes et les conques de boue, et les arêtes de poissons constituent 97% de la faune avec des tortues de mer complètement absentes. Les deux sites offrent une occasion unique d'étudier les différences dans la culture matérielle dans un environnement essentiellement identique. Des descriptions des deux sites, un aperçu des fouilles et un examen des matériaux récupérés sont présentés ici pour la première fois. Une attention particulière est accordée au site Paradise car si peu de sites Redware ont été fouillés (seulement 3 des 16 connus), et les gisements sont considérablement plus profonds (environ 60 cm) que les 10-25 cm signalés pour les autres sites Redware. Enfin, le site Paradise offre la première preuve d'interactions entre les « cultures » de Little River et de White Marl.

Paradise Park se encuentra en el suroeste de Jamaica, entre Ferris Cross y Savanna la Mar. Hay dos sitios arqueológicos en la propiedad en un área sin desarrollar frente a Bluefields Bay. Los dos sitios están separados por 240 m sin materiales culturales intermedios. Las excavaciones se llevaron a cabo en ambos sitios entre 1998 y 2004. Paradise (Wes-15a) es un sitio "Redware" (fase Little River) de *radiocarbono fechado entre cal 673-1428 d.C. Hay un área de casa posible y un denso midden que contiene abundante cerámica, adoquines y copos de chert, conchas de moluscos marinos (especialmente concha reina), piedra caliza agrietada por el fuego y un conjunto faunístico dominado por huesos de tortuga marina. El sitio de Sweetwater (Wes-15b) fue ocupado más tarde (cal 1400 d.C. para el contacto posterior). La cerámica de Sweetwater tiene una pasta completamente diferente, un tratamiento superficial, y se caracteriza por la variedad Montego Bay de la fase White Marl. La cerámica es abundante; chert es presentes en cantidades más pequeñas y escamas de menor tamaño; la piedra caliza agrietada es menos común, el conjunto de moluscos está dominado por almejas y conchas de barro, y los huesos de pescado comprenden el 97% de la fauna con tortugas marinas completamente ausentes. Los dos sitios brindan una oportunidad única para investigar las diferencias en la cultura material en un entorno ambiental esencialmente idéntico. Las descripciones de ambos sitios, una visión general de las excavaciones y una revisión de los materiales recuperados se presentan aquí por primera vez. Se presta especial atención al sitio de Paradise porque se han excavado muy pocos sitios de Redware (solo 3 de los 16 conocidos), y los depósitos son sustancialmente más profundos (unos 60 cm) que los 10-25 cm reportados para otros sitios de Redware. Finalmente, el sitio Paradise ofrece la primera evidencia de interacciones entre las "culturas" Little River y White Marl.*

Introduction

Paradise Park is located on the southwest coast fronting Bluefields Bay on the A2 highway between Savanna la Mar and Ferris Cross, Westmoreland Parish (**Figure 1**). The property is today an 800 hectare dairy farm, but in the 1970s it was a tourist destination with bull riding and a golf course. During an environmental survey of the property in 1990, a number of pre-Columbian potsherds were found on the surface along the old road to Cave Settlement. The late Tony Clarke, Managing Partner, contacted the Jamaica National Heritage Trust (JNHT). Roderick Ebanks then visited the area, excavated five test units, and prepared a report (Ebanks 1992). At the time the site was designated W11, but the numbering system has since changed. Unfortunately, Roderick’s responsibilities as Technical Director of the Archaeology Division of the JNHT prevented him from doing more. Tony called me in 1998.

Paradise Park is on a low-lying coastal plain, with the deeply weathered Chebucktoo Limestone hills to the east (Ebanks 1992). The seaward margin is a series of arcuate, sub-parallel former beach ridges aligned to the present shore. The coastal zone presently is prograding as indicated by mapping undertaken in 1971 and again in 1991. In fact, the first dune along the shore apparently formed in the past 500 years. Shovel tests and walkover surveys failed to reveal any evidence of Indigenous activities on the front coastal dune. Cultural materials only occur on the second dune along the old, unimproved road where Ebanks conducted his research. There is a fringe of red mangroves along this coast. The soils are alluvial and mangrove swamp loams and clays with medium to coarse, moderately sorted carbonate sand of marine origin. Burrowing land crabs are active in the area; in fact, the archaeological sites were found because crabs had moved artifacts to the ground surface. The sites are located in an undeveloped section of the Paradise Park property east of the Sweetwater River along the old road that once connected Savanna la Mar and Cave Settlement. This old road was replaced by the A2 to the north of the property. The river crossing had washed out, and there was little recent traffic on the road.

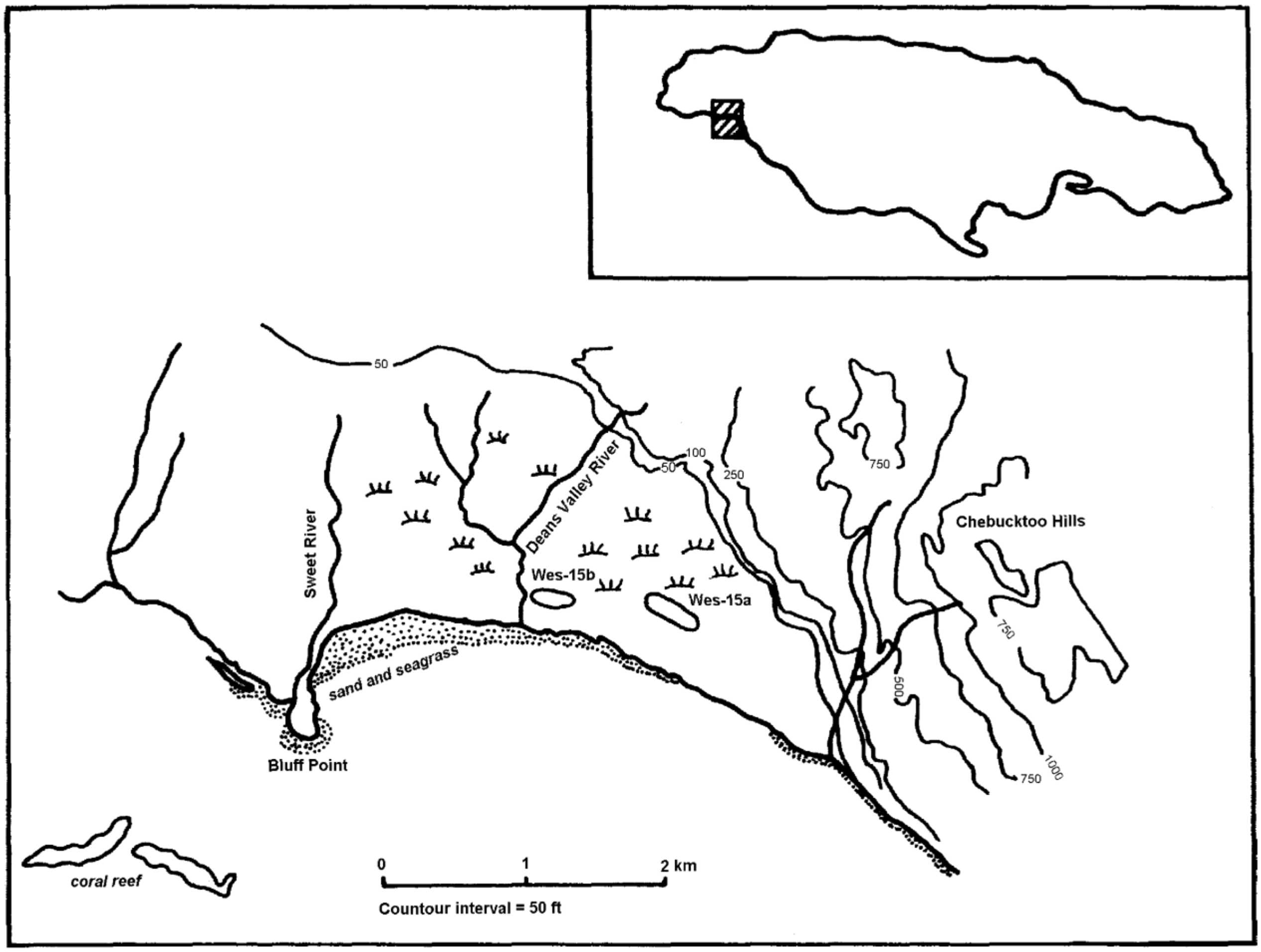


Figure 1. Map of Jamaica showing the location of Paradise Park (top, small box), and the locations of the Sweetwater (Wes-15a) and Paradise (Wes-15a) sites (from Keegan et al. 2003).

We started in 1998 by excavating 50-cm diameter shovel tests at 20 m intervals along the old road for a distance of 1.5 km. The shovel tests indicated there were two distinct archaeological sites. The sites are situated on the second dune from the coast with a freshwater morass to the north and a mangrove swamp to the south. Over time, the river has meandered across the low-lying coastal plain. It once turned west toward Bluff Point, but in recent times a more direct channel to the bay was cut during a hurricane. The morass was created by the isolation of an ancient river meander. The dune on which the sites are located formed in the direction that the river flowed. Thus, even though the deposits at both sites are of comparable depths (0 to about 60 cmbs), the Paradise site is on an older portion of the dune. These same processes, sped by increased sediment flow in the rivers due to land clearance, produced the new coastal dune, probably after the sites were abandoned (Keegan et al. 2003). The occupied dune is quite narrow, averaging about 60 m in width, and is only about 1 to 1.5 m amsl at its highest points.

The vegetation is natural, sea-level, coastal tropical forest, and is dominated by large trees. Some of the larger, economically valuable trees were harvested, but this area across the river from the pastures had been left substantially undisturbed. We returned to these sites over the next four years, and again in 2004, for a total of 15 weeks of fieldwork. Working in the Park was a Disneyesque adventure. The first year we rode on a cattle cart, and later upgraded to a jitney for the trip from the Great House where we lived, across the river, and on to the sites (**Figure 2**).

Figure 2. Jitney ride across the river (in memory of our intrepid tractor driver, Bob Gezon).

The first site, called Sweetwater (Wes-15b), begins about 900 meters east of the Sweetwater River and extends for about 220 m. The site is on slightly higher ground than the Paradise site, supporting mostly tropical hardwoods, including an 80 foot tall Ceiba tree (*Ceiba pentandra*). A total of 71 square meters were excavated, primarily in two large block excavations of 25 (Area 600) and 38 (Area 700) square meters (see field maps in **Appendix 1**). The deposit ranged in depth from 20 to 80 cmbs. The site has one radiocarbon date of cal. AD 1396-1466 (**Table 1**), but was occupied into historic times as indicated by Black rat bones (*Rattus rattus*) encountered to depths of 40 centimeters below ground surface (cmbs). Most of the pottery is undecorated, but the designs that are present can be classified as Montego Bay variety. These designs fit more generally within the White Marl phase (Howard 1956) and Rouse's (1992) Meillacoid series. Mollusks were abundant, especially clam shells, many of which show evidence for use as scrapers. Animal remains were predominantly small fishes (97% of the faunal remains) along with a few hutia (*Geocapromys brownii*) and rice rat (*Oryzomys* sp.) bones. The site also contained a few shell ornaments, a greenstone wedge, and a conch shell (*Aliger gigas*, formerly *Strombus gigas*) celt. A pottery foot was the most unique find from the shovel tests (**Figure 3**).

After a 240 m gap with no cultural materials in any of the shovel tests we encountered the second site. The Paradise site (Wes-15a) is on the dune above a swampier grove of Royal Palms (*Roystonea regia*). It was occupied during a period of lower sea level as indicated by some deposits below the water table. Paradise is a "Redware" site, based on the presence of red-painted pottery (**Figure 4**), and the diversity of wares recognized for the Little River phase (DeWolf 1953). Paradise pottery is consistent with descriptions of Ostiones style pottery in Puerto Rico (Espenshade 2000; Goodwin and Walker 1975; Rouse 1992; Keegan and Hofman 2017). Allsworth-Jones (2008) reports a total of 16 open air Redware sites and one cave site for all of Jamaica, of which only three (including the Paradise site reported here) have been excavated.

Cultural materials were distributed along our transect for 400 m to the east. Radiocarbon dates give a 2-sigma range of cal AD 673-1428 (**Table 1**). A total of 50 square meters were excavated primarily in two block excavations of 6 (Area 300) and 44 (Area 700) m^2 (see Field maps in **Appendix 1**). The site contained an abundance of pottery, fire-cracked limestone, mollusk shells (especially queen conch and olive shells (*Oliva* sp.), some of which were transformed into beads and tinklers), and chert or flint flakes. The most unique finds were an agate-looking ear spool (the stone was not identified) and a stone pendant, possibly the dog god (Opiyelguobíran) from Taíno mythology (see **Figure 13**). The fauna were predominantly sea turtles and fish.

Figure 3. Pottery foot from shovel test (Sweetwater site).

Both sites were hand-excavated with pointing trowels and finer tools. All of the soil was sieved through ¼-inch hardware cloth. One-gallon voucher samples were collected from each of the excavation units and wet-screened through 2 mm^2 window mesh (**Figure 5**). Excavations in areas with clay soils necessitated the use of water screening. This was especially important for recovering small fish bones, lithic micro-flakes, and beads. Fieldwork was conducted in the morning to avoid the daily afternoon rains. Samples from each day were processed in the Great House every afternoon. Knowing the finds from the previous day provided the opportunity to fine tune the research on a daily basis. Students were engaged to conduct more in-depth analyses of the pottery, lithics, and fauna. Unfortunately, none of these studies was completed.

Figure 4. Red-painted pottery recovered below the water table in the Paradise site.

Table 1. Radiocarbon dates from Sweetwater and Paradise sites.

Lab #	Site	Area	Unit	Depth (cmbs)	Material	14C age (BP)	cal AD[1]	Median cal AD
Beta-620131	Paradise	400	E	7	charcoal	100 +/- 30	1802-1936 (69.3%) 1683-1735 (26.1%)	
Beta-620132	Paradise	400	N	30-40	charcoal	1250 +/- 30	673-778 (60.3%) 785-838 (26.4%)	725
Beta-620133	Paradise	400	S	30-40	charcoal	180 +/- 30	1722-1814 (49.9%) 1656-1698 (19.2%) 1910-modern (19%)	
Beta-620134	Paradise	400	G	39	charcoal	560 +/- 30	1312-1362 (48.5%) 1386-1428 (46.9%)	1337 1407
Beta-125832	Paradise	200	na	50	shell	1180 +/- 60	710-896 (95%)[2]	803
Beta-125833	Sweetwater	100	na	59	charcoal	530 +/- 60	1396-1466 (95%)	1431

[1]Calibration: BetaCal4.20: HPD method: INTCAL20. [2]Recalibrated with Marine 20 database (ΔR = -193).

The one radiocarbon date obtained for the Sweetwater site in 1998, was recalibrated using the same program as the new dates (**Table 1**). Originally reported as cal AD 1390-1490 (2σ), the new range is cal AD 1396-1466. In addition to this date, the presence of Black rat bones (*Rattus rattus*) in the deposit indicate that Sweetwater was occupied after European contact.

The original radiocarbon date for the Paradise site was obtained from conch shell (*Aliger gigas*) in 1998. It was reported as cal AD 780-999 (2σ), and has been recalibrated using current marine corrections (ΔR= -193 ± 29) as cal AD 710-896. Four samples from Paradise were submitted to Beta-Analytic in February 2022. Unfortunately, two of the dates are post-contact. This is not entirely surprising given historic use of the area, crab disturbance, and the shallow depth of one sample (7 cmbs) which was specifically chosen to date when the site was abandoned. The two other radiocarbon dates offer unique information on the Redware occupation of Jamaica. The cal AD 673-778 (60.3%) confirms Redware settlement began by the turn of the 8th century (median cal AD 725), and the conch shell date indicates that the site was occupied until the 9th century (median cal AD 803). The other new date suggests Paradise may have been occupied much longer, until cal AD 1390-1428 (95.4%), well after the currently accepted end date (medians cal AD 1337 or 1407). There currently are no other end dates for the Redware occupation in Jamaica. The end date currently is based only on equating the end of Redware with the beginning of White Marl. It is a mistake to place too much weight on one radiocarbon date, but different "cultures" (e.g., Meillacoid and Chicoid in Hispaniola) lived distinct yet contemporaneous lives on other islands (Keegan and Hofman 2017). This issue is addressed in greater detail below.

Finally, there is a small, flooded sinkhole across the main road near the entrance to the property. Given the then recent, spectacular discoveries underwater at the Manantial de la Aleta (sinkhole) in the Dominican Republic (Beeker et al. 2002; Conrad et al. 2001) and at blue holes in The Bahamas (Palmer 1989); David Fenley, Joe McKnight, and I made an exploratory SCUBA dive. This shallow sinkhole has deep, silty sediments that reduced visibility to zero in a matter of seconds. Nothing was found.

Figure 5. Micah Mones and Ricardo Tyndall wet screening.

Environmental differences often are used to explain cultural differences. The two sites provide an opportunity to examine cultural change (as first indicated by differences in pottery styles) in a shared environment. In other words, at Paradise Park the environment was essentially the same – or at least offered no substantial differences. Therefore, if the two sites contained different materials, then it was people who were responsible. A description of the two sites and the materials that were recovered from each is presented. This is followed by a comparison of the sites, evidence for possible interactions between the two, and a discussion of the broader implications.

Figure 6. Bill Keegan, Terry Hines, Ben Castricone, and Sylvia Chappell prepare to lay out Unit XX at the Paradise site.

Paradise Site (Wes-15a)

The Paradise site is located 240 meters east of the Sweetwater site and about 1.5 km from the current course of the Sweetwater River (**Figure 6**). The site was directly on the fronting beach dune when it was occupied, but a new dune has formed between the site and Bluefields Bay over the past 500 years (Keegan et al. 2003). There is a freshwater morass to the north and a mangrove swamp to the south. The coastal location matches that for other Redware sites on the south coast. For example, the eight occupation sites identified in the 40 km long “Alligator Pond-Great Bay-Black River” corridor in neighboring St. Elizabeth Parish to the east (Lee 1980:598). The vegetation is dry tropical forest, distinguished from other areas by a high density of Royal Palm trees.

Our three radiocarbon dates have a two-sigma range of cal. AD 673-1428 (see **Table 1**). There is only one other radiocarbon date for a Redware site in Jamaica, AD 537-995 (Wesler 2013). This date from the Bottom Bay site was obtained in 1967, when radiocarbon dating was in its infancy (Vanderwal 1968), and thus should be used with caution (see DiNapoli et al. 2021). The later date indicates that there was activity at the site in the early 14th to early 15th centuries, but it is not certain whether this reflects a continuation of the Redware occupation or people from the White Marl phase using the area (see below).

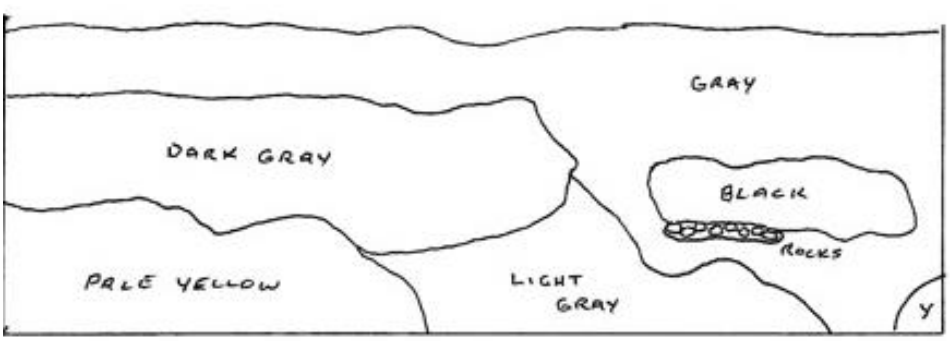
Shovel tests revealed that cultural materials are distributed for a distance of 400 meters along the old road. The length of the site likely reflects repeated occupations in the same general area over time, and not a single long-term occupation. This type of shifting settlement is common among tropical horticulturalists, and in comparison, characterizes coastal settlements in The Bahamas (Keegan 1997). However, because we obtained radiocarbon dates from only one area of the site, the possibility of shifting settlement cannot be tested. The site contains Redware pottery (below), and is attributed to the initial Ceramic Age colonization of Jamaica (Allsworth-Jones 2008).

Block excavations were initiated in two areas (see field maps in **Appendix 1**). In 2000, a 1 by 6 meter, North-to-South-oriented trench was excavated to the south of the road near the western boundary of the site (Area 300). The marl soil was wetter and stickier than soil to the north, the unit was disturbed by numerous crab burrows, the artifacts were smaller, and their distribution less dense. The deposit appeared to have been formed by the displacement of materials from higher up the dune, so the excavation was discontinued.

Area 400, 100 m east of Area 300, was selected for excavation based on the quantity of materials recovered during shovel testing. It is to the north of the road and of slightly higher elevation. We began with a 1 by 13 meter, North-to-South-oriented trench (units A-R); extended with a 1 by 6 meter trench to the west at the first unit (units S-X at A), and a 1 by 3 meter extension to the west at the middle unit (units G-L). In 2004, four 2x2 m^2 units were added near the north end of the baseline trench (units XX, YY, ZZ, and Nancy). These units were hand-excavated in 10 cm levels because no natural or cultural strata were observed. The soil is dry, dark sandy loam, which facilitated screening through ¼-inch hardware mesh. In addition, two-gallon voucher samples were collected for water screening.

The original trench (units A-R) contained a few classic, red-painted sherds, chert, and other materials at low density. There was a possible large post stain (ca. 40 cm in diameter) in Unit A (**Figure 7**), and another in Unit N. In comparison, the 2x2 m^2 units to the east of the original trench had a far denser concentration of materials, suggesting a midden deposit associated with a cleaner living area to the west. Unit XX provides the most complete stratigraphic record. Materials from this unit are used here to characterize the deposits. The depth of the deposit is about 60 cm, which is much deeper than the typical 10 cm and maximum 25-cm depths reported for other Redware sites (Lee 1980). The main concentration occurs between 10 and 40 cmbs (**Figure 8**).

Figure 7. 40-cm diameter circular stain in Area 400, Unit A, at 60 cmbs.



Gray 2.5Y 5/2
Light Gray 2.5YR 6/2
Dark Gray 2.5YR 4/1
Yellow 2.5Y 7/3
Black 5YR 2/2

0__________________________1 m

Figure 8. Profile of Area 400, Unit XX.

Lithics

One of the most noteworthy characteristics of the site is the large quantity of fire-cracked limestone (FCL) (**Table 2**). There is far more FCL at the Paradise site than was recovered at Sweetwater. This difference may reflect changes in food preparation over time, and/or the preparation of limestone for pottery temper. The fine wares have crushed limestone temper, and coarse wares have larger limestone inclusions (discussed below). Because limestone is unstable when heated, burning and then crushing limestone for temper would help prevent spauling, fractures, and disintegration when the vessel was fired (Rye 1976).

Thermally altered stone is associated with archaic methods of food preparation, including the use of hearths and earth ovens (Ciofalo et al. 2018; Thoms 2008). The observable difference between these cooking techniques is that rocks line the bottom of hearths with an open fire built on top, while the rocks in earth ovens are placed on top of the coals and then covered with earth to bake the contents (**Figure 9**). We did not find any intact earth ovens, but a hearth is visible in the profile of 400XX (see **Figure** 8). Nevertheless, it is worth considering the possibility that foods were cooked in earth ovens and by methods in addition to cooking in pottery vessels (Keegan et al. 2020). These alternate cooking methods traditionally are associated with preceramic and mobile populations (Thoms 2008; Voorhies and Gose 2007), and may reflect practices still in use by this pioneering population (see Lee 1980).

Table 2. Fire-cracked Limestone from Unit XX (2x2 m^2) by 10 cm level (= per 0.4 M^3).

Level	Count	Weight (kg)
1	128	6.5
2	255	12.3
3	333	19.8
4	227	16.7
5	12	0.3
Totals	**955**	**55.6**

Figure 9. Concentrations of fire-cracked limestone at GT-2 (Grand Turk), which are similar to Paradise Park concentrations, but easier to see against light color sand (see Keegan et al. 2020).

There also were 14 pieces of flaked limestone (367 g). Limestone tools have been identified in The Bahamas, and may have been used here when a sharp cutting edge was not preferred (e.g., scaling some fishes). The fragments of a limestone grinding slab and possible hand stone, a possible shaft scraper, and nine unmodified cobbles were recovered.

The other common lithic is chert (flint), which could have been obtained from the river gravels. The collection includes unworked cobbles, cobbles from which one flake has been removed to test quality, and flakes without cortex in various sizes (**Table 3**). No blades were recovered, and the flakes are expedient, lacking any retouch. They were produced by freehand and bipolar techniques (**Figures 10 & 11**). Identified chert tools include two hammers, two cores, one chopper, and a possible shaft scraper. Some difference in color was noted. Flakes with a yellow or red hue were heat-treated for flaking. Although not quantified, yellow/red chert seemed more common here in comparison to the Sweetwater site.

Table 3. Chert from all units in Area 400 (25 m^2 excavation area).

AREA 400	COBBLES		FLAKED COBBLE		FLAKES	
Level	**Count**	**Weight (g)**	**Count**	**Weight (g)**	**Count**	**Weight (g)**
1	107	4170	2	52	184	2597
2	202	8351	2	374	503	6984
3	147	6529	7	224	217	2961
4	121	6115	1	5	210	4194
5	24	2588	1	48	64	763
Totals	**601**	**27753**	**13**	**703**	**1178**	**17499**

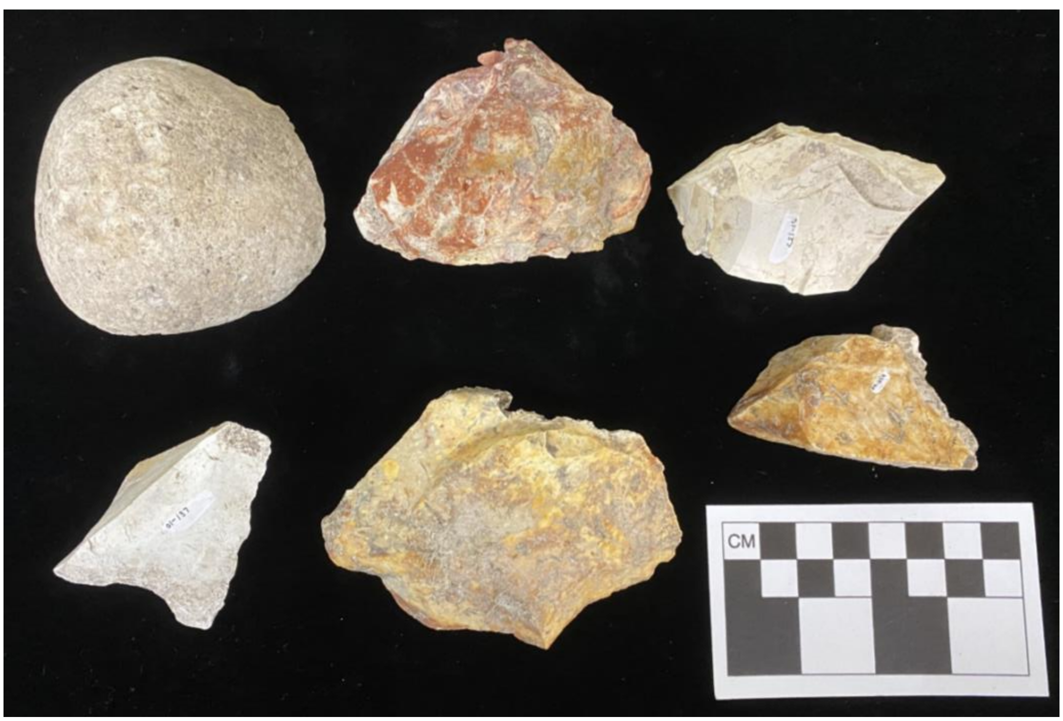


Figure 10. Area 400 lithics. (top): split cobble, red-color chert, white chert flake; (bottom): white chert shaft scraper, yellow core, red-yellow flake.

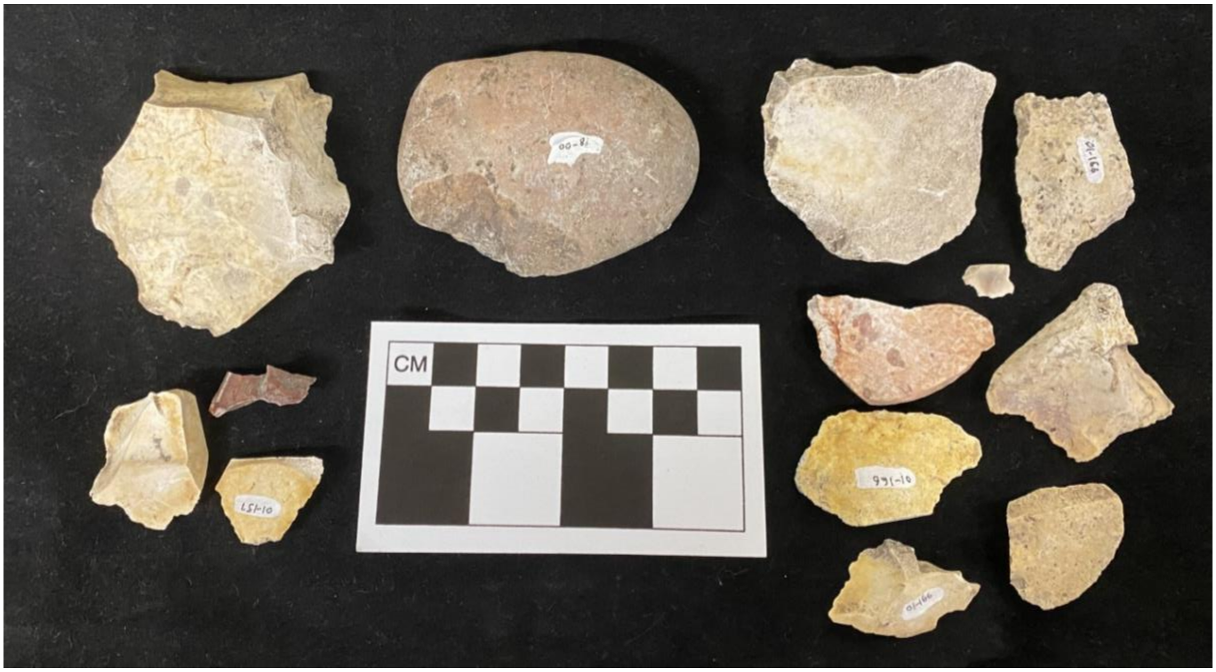


Figure 11. Area 400. Assorted chert flakes and chert cobble with one flake removed (top center).

Finally, greenstone flakes, probably chipped from celts, were present (n=62), but only two broken greenstone celts, one possibly also used as a pestle, were recovered (**Figure 12**). The most unique finds were a green-color pendant representing the dog *cemí* (**Figure 13**); and an agate(?) stone ear spool from 400A at 5 cmbs (measuring: 12 mm outer diameter, 9 mm inner diameter, with 5 mm diameter grove and a biconical 2 mm wide hole).

Figure 12. Area 400. Broken stone pestle/celt.

Figure 13. Area 400. Dog *cemí* pendant. There are suspension holes at the top through the arms.

Pottery

Pottery was found in abundance at the Paradise site. Area 400, Unit XX provides an example by level (**Table 4**). Although often referred to as "redware," only a relatively small percentage of the sherds are painted red. The majority of the sherds are reminiscent of DeWolf's (1953:233) description of the Little River phase: "…ware, medium fine grained but poorly fired; color, reds, tans and greys; average thickness 0.5 cm; shape, open bowls with some flat bottoms; shoulder, straight or incurving; rim, tapered to the lip; lip, rounded or flat; D-shaped handles, amorphous and tab lugs; some painting and rubbing of restricted areas." However, her description was based on only 33 sherds. Lee (1980) suggested that some of the pottery could represent the late-Saladoid Cuevas style from Puerto Rico, perhaps due to the occurrence of buff-color vessels. However, the sherds at Paradise lack the paste qualities and surface treatment of Cuevas, and would not be classified as such in Puerto Rico (Lisabeth Carlson and Emily Lundberg, personal communication, 2022). The Paradise assemblage more closely resembles the Ostiones style in Puerto Rico (see Espenshade 2000; Goodwin and Walker 1975; Keegan and Hofman 2017; Rouse 1992).

Table 4. Counts and weights of pottery from Area 400, Unit XX (2 m^2) as an example of the quantity of pottery in the midden.

Level	Count	Weight (g)
1	151	836
2	232	1692
3	335	1690
4	380	2489
5	66	859
6	52	200
Totals	**1216**	**7766**

Red-painted pottery is relatively rare. The vessels were fired at low temperatures as evidenced by black cores. Lower temperatures were necessary due to the high limestone content of the clay and temper, which makes the paste unstable at higher firing temperatures. Colors range from almost white to grey, tan, red, and even black. Redder pastes reflect clays with a higher iron content fired in an oxidizing environment. Cooking and serving vessels, along with pancake and raised rim, thick clay griddles (22-33 mm thick) are present. Vessel shapes are difficult to determine because the pottery is so highly fragmented due to its high limestone content. Coarse ware sherds, especially, have ragged edge-fractures. Ebanks (1992) illustrates these ragged-edge sherds as "triangular" forms.

The pottery is reminiscent of the description for Ostiones pottery at the Villa Taina site in western Puerto Rico, where a division was made between "fineware" and "crudeware," with the former red slipped and the latter more common and less often slipped (Goodwin and Walker 1975). Three different types of Redware paste were identified at the Paradise site (box below). These types are further divided into fine ware and coarse ware, based on temper (sand, limestone, or mixed), with only the fine wares occasionally painted (limestone tempered wares are not painted). Large D-shaped handles (**Appendix Figure A2-B3**) and smaller flat and round handles are present, including one horizontal loop handle with incisions on raised nubbins above and below the handle (**Figure 6**, top center) (Lee 1980:609, "Type 4"). Decoration is not common and limited to peg lugs (**Appendix Figure A2-B4**), simple head forms (**Appendix Figure A2-A4**) and 'turtle flipper' shaped lugs (one incised) (**Appendix Figure A2-A2**). A more comprehensive description of sherds from the Paradise site is in progress. What follows is a general description of pottery from Area 400, Unit XX, which provides the best stratigraphic distribution (see **Appendix 2** for photographs of sherds from each level).

Dr. Lindsay Bloch, Collection Manager for Ceramic Technology at the Florida Museum, examined the pottery from Area 400, Unit XX, and identified three distinct paste types. There is a possible fourth paste type which has large, subrounded volcanic inclusions with eroded surfaces, but completion of the more detailed analysis of the entire collection is needed to confirm this.

Paradise Variety Paste Types

Paste type 1. Sand tempered. Texture like fine sandpaper/emery board. Subangular grains of quartz sand dominant, with occasional subrounded ferric nodules and limestone/white rock. Rare black "peppery" grains.
1A: Coarse: mix of fine to medium inclusions, thicker sherds, rougher surface. Mainly cooking vessels with strap handles. Thickness: 6-8 mm.
1B: Fine: primarily fine-grained inclusions, occasional larger limestone fragments. More compact surface. More serving vessels. Thickness: 4-8 mm.
IC: Fine with red paint

Paste type 2. Limestone tempered. Texture blocky with abundant coarse limestone fragments or blocky voids from dissolved limestone.
2A: Coarse: abundant inclusions, thick, darker surfaces. Mostly griddles, thickness: 18-32 mm; and some body sherds, thickness: ~10 mm.
2B: Fine: still thick, but smoothed surfaces, paler surfaces. Mix of cooking and serving, thickness: 6-10 mm.

Paste type 3. Fine mixed temper. Both quartz and limestone temper, but fine particle size. Smoothed surfaces, mainly serving vessels.
3A: Fine, unpainted, thickness: 3-7 mm.
3B: Fine, red painted, thickness: 4-7 mm.

Mollusks, Echinoderms, and Corals

The mollusks from the site have been reported in detail (Keegan et al. 2003). Pleurodonte land snails (*P. chemnitziana and P. pallescens*) are common on the site today and in the archaeological deposits.

More than 3,800 NISP of marine mollusks representing 54 taxa were identified. Queen conch shells are common (32% of MNI), both complete and fashioned into a variety of tools (e.g., picks, celts, hoes) (see Keegan et al. 2018). The most common bivalves are in the Families Cardiidae (e.g., *Trachycardium muricatum*, *Americardia media*, *Laevicardium laevigatum*) and Veneridae (e.g., *Periglypta listeri*, *Chione cancellata*). These clams are important indicators of environmental quality. Cardiidae and Veneridae do not tolerate stagnant conditions. They are most common in predominantly coarse sand substrates with low silt content and continually well-circulating waters. They are shallow burrowers (1–3 cm), and are less tolerant of temperature fluctuations. "*Thalassia* seagrass environments deeper than 1 to 2 m are dominated by these eulamellibranch suspension-feeders [Cardiidae and Veneridae], although Lucinidae also are present" (Jackson 1973:330). Cardiidae and Veneridae have a relatively complex feeding apparatus and cannot accommodate large food particles in the way that Lucinidae can. They indicate that Bluefield's Bay had a healthy seagrass environment in contrast to the modern siltation that is choking the bay.

Echinoid fragments from Area 400 are concentrated between 35 and 55 cmbs, which corresponds to the primary occupation of the site. These specimens likely reflect human activities, and provide additional evidence for reconstructing the local marine environment. The majority of the test (endoskeleton) fragments come from the irregular echinoid, *Clypeaster rosaceus*. A second taxon, the regular echinoid, *Eucidaris tribuloides* also was identified. The two specimens examined were small, well-preserved, primary spines (radioles). Lastly, a single test fragment of ambulacra with pores came from *Meoma ventricosa*. The presence of these taxa is evidence for a marine environment dominated by *Thalassia* grass and fringing bare sandy areas. Because of their size and visibility all three taxa easily could have been collected, especially at night when they feed. Whether these echinoids were consumed for food is unknown, although the eggs of regular urchins have been eaten for several thousand years. In addition, the larger, relatively stout radioles of *E. tribuloides* could be used as files for very fine woodworking.

Six taxa of corals were recovered: staghorn (*Acropora cervicornis*), elkhorn (*Acropora palmatta*), brain (*Diploria* sp.), star (*Montastrea* sp.) and finger (*Porites porites*). As with all materials we need to consider the role of humans in bringing them to the site. The nearest coral reef is near Bluff Point (see **Figure 1**), which is over 2 km from the site by water. It is possible that corals were scavenged from the beach, but the location of the reef to the west of Bluff Point limits the natural transport of corals. As a result, corals are rare on the beach near Paradise Park. It also has been suggested that the polyps of corals scavenged from the beach typically are too abraded to be used as tools, and that live corals collected on the reef were preferred. Corals in the site show evidence of use as drills, rasps, and abraders, although a detailed analysis of use-wear has yet to be conducted.

Vertebrate remains

A preliminary study of the vertebrate remains was started but never completed. Green sea turtle (*Chelonia mydas*) was the most abundant animal in the deposit. The bones show evidence for butchering and burning. Their importance is reflected in the representation of turtles on pottery vessels. Sea turtles are a fragile resource, and their numbers are depleted rapidly after the start of human predation (Carlson 1999). One Atlantic loggerhead turtle (*Caretta caretta*) and three pond turtles (*Trachemys* sp.) also were identified. As expected, fishes were a major component of the diet. Twenty-two taxa were identified, of which the most common were grouper (Serranidae), jack (Carangidae), grunt (Haemulidae), parrotfish (Scaridae), and puffer (Tetrodontidae). These fishes are common on the nearby reef, but also could be caught in traps and nets when they disperse over seagrass meadows to feed at night (Keegan 1986). Only two species of mammals were recorded: hutia and rice rat. They comprise a very small component of the assemblage (about 5% of MNI). Finally, the presence of Jamaican boa (*Epicrates subflavus*), Anole (*Anolis* sp.), and iguana (*Cyclura collei*) was noted.

Sweetwater Site (Wes-15b)

The Sweetwater site is located about 900 m east of the current course of the Sweetwater River (see **Figure 1**). The site was directly on the fronting beach dune when it was occupied, but a new dune has formed between the site and Bluefields Bay over the past 500 years (Keegan et al. 2003). There is a freshwater morass to the north and a mangrove swamp to the south. The coastal location is markedly different from the hilltop location of many contemporaneous White Marl sites on the island (Allsworth-Jones 2008; Wesler 2013), but coastal and mangrove settings are not unusual for Meillacoid sites on other islands (Keegan and Hofman 2017; Veloz Maggiolo et al. 1981). The vegetation is dry tropical forest, and there is a 30 m tall Ceiba tree on the site. The Royal Palm trees that are prevalent on the Paradise site are not found here. Our one radiocarbon date has a two-sigma range of cal. AD 1396-1466, with Old World rat bones indicating that the site was occupied after the arrival of Europeans. The date is consistent with other dates for White Marl sites in Jamaica (Wesler 2013).

A total of 71 square meters were excavated in four Areas: Area 100 (2 m^2), Area 500 (6 m^2), Area 600 (21 m^2), and Area 700 (38 m^2) (see Field maps in **Appendix 1**) (**Figure 14**). The site contained abundant lithics, pottery, mollusk shells, and animal bones. These show significant differences with the neighboring Paradise site. There is substantially less FCL, far more clam shells, and only fishes – no sea turtle bones. The pottery is predominantly plain and undecorated (*circa* 90%). The sharp inturn at the shoulder and decoration largely restricted to a folded rim is consistent with the Montego Bay variety of the White Marl phase.

Figure 14. Earthwatch volunteers excavate the Sweetwater site with Roderick Ebanks (top right), then JNHT Technical Director of Archaeology, in September 2001.

Lithics

There is significantly less fire-cracked limestone (FCL) is the Sweetwater site. **Table 5** summarizes the counts and weights that were recorded for all of Area 700. Only 174 rocks weighing 10.8 kg were collected from 57 m^2 compared to 955 rocks weight 55.6 kg in one 2 m^2 unit at Paradise. Limestone was clearly put to different purposes at the two sites, and likely reflect differences in pottery manufacture and food processing. Limestone was not used to temper pottery vessels and the smaller quantities indicate that earth ovens, which involve the single use of a substantial number of rocks, were not used. There were also 31 limestone cobbles of which six appear to have been used as polishing stones.

The other common lithic is chert, which could have been obtained from river gravels (**Table 6**). The collection includes unworked cobbles, cobbles from which one flake has been removed to test quality, and flakes without cortex in various sizes (**Figures 15**). No blades were recovered, and the flakes are expedient, lacking any retouch. They were produced by freehand and bipolar techniques. Identified chert tools include one hammer, one core, and two pestles. Fewer chert flakes from this site have the yellow or red hue used to identify heat treating prior to flaking. In fact, the deposits have far less chert than the deposits at the Paradise site. Most of the cobbles in level 6 are too small to have been selected for tool making. Their high frequency reflects river-transported gravel, probably deposited by flooding.

Table 5. Fire-cracked Limestone from the Area 700 by 10 cm level.

Level	Count	Weight (kg)	sq. meters
3	63	3.8	26
4	75	4.4	18
5	36	2.6	13
Totals	**174**	**10.8**	**57**

Table 6. Chert from all units in Area 700 (38 m^2 excavation area).

AREA 700	COBBLES		FLAKED COBBLE		FLAKES	
Level	Count	Weight (g)	Count	Weight (g)	Count	Weight (g)
1	1	46	0	0	2	4
2	0	0	0	0	2	4
3	15	666	1	43	33	205
4	40	242	1	26	37	119
5	12	766	0	0	23	119
6	38	2148	1	42	27	217
Totals	**106**	**3868**	**3**	**111**	**124**	**668**

Figure 15. Chert hammer (top center), chert core (top right), and a variety of chert flakes from Area 600.

Other lithics include a broken greenstone celt; five pieces of quartz; a small, partially worked crystal (11 g); and a possible piece of red ochre (53 g). Several unworked, small blue-color rocks were found; local geologist, Tony Porter, told us there is a source for this rock in Jamaica.

Pottery

The abundant pottery at the Sweetwater site is completely different from the pottery at Paradise. The paste has fine mineral inclusions (it has not been determined if temper was added or if the clay was self-tempered), with limestone only present as a rare inclusion. All of the sherds have well-smoothed interior and exterior surfaces. There are no coarse wares. The pottery ranges in color from red/brown (most common) to black, and was fired in a more reducing environment. There are no light or buff color sherds. Sherd thickness ranges 5-10 mm; however, this measure is deceiving because large vessels are thicker at the base and taper toward the rim (see Espenshade 2000). The sherds exhibit smooth coil breaks in sharp contrast to the ragged edges of sherds at Paradise.

Area 600, Unit A provides an example by level (**Table 7**) (see **Appendix 3** for photographs of sherds from each level). Most of the pottery is undecorated. Cooking and serving vessels, along with pancake and raised rim, thick clay griddles are represented. Griddles are not common, and tend to be thinner (17-23 mm thick) than at Paradise. Vessel shapes are difficult to determine because the pottery is so highly fragmented. The most common feature is the tapered fillet rim, which is formed by an exterior folding of the rim coil. When present, there tends to be a very narrow distance between a sharp inturn from the shoulder to the rim. This significantly limits the size of the panel on which most White Marl and other Meillacoid series vessels are decorated. One result is that incisions are most common on the folded rim. This characteristic has been classified as Montego Bay variety (Allsworth-Jones 2008), which is found primarily in western Jamaica (Montego Bay is 50 km north of Paradise Park). Appliqué, and other common types of White Marl phase motifs, are present (see **Appendix Figure A3-7**). A more comprehensive description of sherds from the Sweetwater site is in progress.

Table 7. Counts and weights of pottery from Area 600, Unit A (2 m^2) as an example of the quantity of pottery in the site.

Level	Count	Weight (g)
1	34	143
2	166	590
3	102	694
4	138	944
5	68	432
6	91	651
7	10	103
Totals	**609**	**3557**

Mollusks, Echinoderms, and Corals

The mollusks from the site have been reported in detail (Keegan et al. 2003). As with Paradise, Pleurodonte land snails are common on the site today and in the archaeological deposits. It is not certain whether all were collected and eaten or simply reflect continuity in the terrestrial environment (see discussion). More than 10,600 NISP of marine mollusks representing 56 taxa were identified. Queen conch were far less common than at Paradise (only 8% of MNI), essentially replaced by mud conch (*Melongena melongena*), which prefer mangrove habitat. The Sweetwater site contains far more bivalves of the Lucinidae family (48% of MNI). Lucinidae (e.g., *Lucina pectinata* and *Codakia orbicularis*) are deep burrowers (6–15 cm) and are tolerant of large temperature fluctuations and stagnant conditions. For example, the tiger lucine (*C. orbicularis*), is tolerant of low salinity, and lives in anaerobic sediments where its food is synthesized by chemoautotrophic sulfur bacteria in its gills. The most common Lucinidae in this site, *L. pectinata*, is most often found in the vicinity of mangrove swamps.

Clamshell scrapers were the most common tools, and exhibit a variety of use patterns (**Figure 16**). A small number of expedient conch shell tools were recovered. Olive shell (*Oliva* sp.) beads and tinklers, and nacreous inlay or fishing lures are present but rare. Finally, a broken fishhook made from a West Indian top shell (*Cittarium pica*) was found in Area 700, Unit S between 30-40 cmbs (**Figure 17**).

Figure 16. Clamshell scrapers from the Sweetwater site. L. pectinata (top row, top left serrated edge); C. orbicularis (middle row); Anadara gibbosa (bottom row left) and Tellina fausta (bottom row right).

Figure 17. (left) Shell inlay (cf. *Pinctada radiata*) from Area 600, Unit W, 20-30 cmbs; (right) shell fishhook (*Cittarium pica*) from Area 700, Unit S, 30-40 cmbs.

Only one echinoid taxon was identified, *C. rosaceus*. The same six corals found at the Paradise site were also found here, with a similar array of abraded use-wear (Keegan et al. 2003).

Vertebrate remains

A preliminary study of the vertebrate remains found that sea turtles were completely absent from the analyzed sample, and the assemblage exhibits far less diversity than Paradise. Fishes comprise almost 96% of the animal bones at Sweetwater. Of the 22 identified taxa, the most common were groupers, grunts, and parrotfish. Thus, although the same fish taxa occur at both sites, there appears to be a shift in the species that were targeted. This may reflect a change in fishing practices, the depletion of particular species through overfishing, and/or changes in the marine environment as noted above. Hutia and rice rat were both present, but in small numbers. The limited use of mammals at Sweetwater is striking in comparison to other White Marl sites, which are typically more inland (Scudder 2006).

Site Comparisons

The archaeological sites at Paradise Park provide a unique opportunity to investigate the Indigenous history of Jamaica. Both are located in the same, relatively undisturbed environmental context. Although White Marl sites have received far greater attention (Allsworth-Jones 2008; Allsworth-Jones and Wesler 2012; Keegan and Atkinson 2006; Wesler 2013), the Sweetwater site is an unusual coastal setting compared to the hilltop sites around Kingston and elsewhere. The Paradise site is one of only three Redware sites to be excavated (Wesler 2013). The site has substantially deeper deposits than the other known Redware sites (about 60 cm versus 10-25 cm). Many of the coastal sites throughout the Caribbean are today threatened by rising sea level. There is a lot of research to be done at both sites beginning with more comprehensive studies of the excavated materials. More detailed studies of pottery from both sites are underway.

Starting from a very general perspective, one of the most important results of this research concerns long-term changes in Bluefields Bay. A main effort in the lab involved the cleaning, sorting and weighing of mollusk shells (**Figure 18**). The mollusks and echinoderms told an interesting story. A total of almost 4,000 shells were identified in the Paradise site. Conch shell was abundant as were clams, predominantly in the Family Cardiidae (think cockles). Cardiids prefer free-circulating seawater and cannot feed where there is a high sediment load. In contrast, of the more than 10,000 shells at the Sweetwater site, most were clams that thrive in silty waters and mangrove habitats (especially those in the Family Lucinidae) and mud conchs (Melongidae). There were far fewer queen conch shells at Sweetwater. We interpreted this shift as the product of the increasing siltation of Bluefield's Bay (Keegan et al. 2003). This likely resulted from increased sediment loads in the Sweetwater and Dean's Valley Rivers caused by Indigenous land clearance. This process has continued as evidenced by a new dune in front of the dune on which the archeological sites are located, a prograding shoreline recorded between surveys conducted in 1971 and 1991, poor visibility in Bluefield's Bay, and a dying coral reef. Although many earlier projects documented environmental degradation on land (Atkinson 2006), this was one of the first to show that Indigenous people had significant, large-scale impacts on marine environments.

Figure 18. JNHT archaeologists processing mollusks from the Sweetwater site.

There are many other substantial differences between the two sites. The one common element at both is the large numbers of

Pleurodonte land snails – living and dead. I was initially undecided as to whether these were collected and eaten, so we harvested and ate some. They were essentially tasteless, and at only four grams of meat it would take a lot to make even an appetizer. Nevertheless, they are easily collected, and most people appreciate diversity in their diet. We need to stop thinking of small morsels, especially small mollusks, as survival foods. When calories from cultigens are readily available, there is time to pursue what might be considered inefficient foraging strategies (Keegan et al. 2019). Like chip-chips in Trinidad (Keegan and Carlson 2008:61-65), these small land snails may have been sought as a special food *because* they were so expensive in terms of nutritional return per labor investment. What remains at issue is how many of the Pleurodonte snails in a deposit were consumed as food and how many are snails that died naturally on the site.

Continuing with the theme of food. There are significant differences in the animal remains at the sites. The earlier Paradise site contains an abundance of sea turtle bones; these are completely absent from the Sweetwater site faunal sample and were not observed during excavation. The extirpation of sea turtles also is observed at early sites in the Bahama archipelago and elsewhere in the Caribbean (Carlson 1999; Keegan and Hofman 2017). As the largest single package of meat, and given their vulnerability during nesting, it is not surprising that sea turtles were targeted by the earliest inhabitants of an area. Fish bones are common at both sites, although there are differences in the relative ubiquity of different taxa. The differences may relate to increasing turbidity in Bluefields Bay, different fishing techniques (e.g., shell fishhook at Sweetwater), and/or the overexploitation of specifically targeted taxa. Of note is the rarity of hutia and rice rats compared to more inland sites on the island.

The mollusks also are markedly different. Whelk shells (*Cittarium pica*) are present at both sites, which indicates foraging along the rocky shore of Bluff Point and the western shore of the bay. These may have been collected during reef-fishing expeditions (Keegan et al. 2019). In addition to being a food source, they were shaped into scoops and made into fishhooks. At Paradise, the mollusk assemblage is dominated by queen conch (including complete shells) and a variety of cockles. Queen conch shells are found in small numbers at Sweetwater, but most often as expedient tools. Clams (*C. orbicularis* and *L. pectinate*) and mud conch (*M. melongena*) are the dominant Sweetwater shells, but are virtually absent from the Paradise site. These taxa reflect a stronger reliance on mangrove resources.

There were substantial numbers of chert flakes at both sites. Cobbles, large flakes, choppers, and various expedient tools were far more common at Paradise. The one observed use was for butchering sea turtles. In contrast, Sweetwater lithics tend to be smaller in size and exhibit less diverse forms. In addition, there was less red-yellow discoloration from heat treating at Sweetwater. Freehand and bipolar techniques were used at both sites.

The other significant difference is the abundance of FCL at Paradise. This likely reflects both the heating of limestone for the production of temper, and the use of limestone in hearths and earth ovens. It is common to assume that other forms of food preparation were abandoned once pottery was available. Clay pots are superior for cooking liquids (e.g., stews), but, just like today, other foods are better prepared using different methods (e.g., grilling, roasting, baking). The smaller quantity of FCL at Sweetwater may reflect a shift away from food preparation involving "hot rocks" (Thoms 2008), with the production of temper as the main use for FCL. Finally, limestone cobbles are more abundant at Sweetwater which could reflect their use as fishing net weights.

The pottery in the sites is unmistakably different, and represents two distinct manufacturing processes and decorative styles. The latter are important because decorative modes have been emphasized in Caribbean pottery classifications. Although different modes occur at Paradise (red painting and turtle flipper lugs) and Sweetwater (fillet rim, incision, appliqué, and no painting), the vast majority of the pottery is undecorated. A more careful consideration of plain body sherds is warranted.

Paradise can be classified as a Redware site, with 22% of the sherds having a "red surface treatment" (see **Appendix 4**). Nevertheless, the pottery at Paradise is diverse, ranging in color from almost white to grey to dark red to black. There are at least three types of paste with both fine and coarse examples of each. The finer wares are more completely fired, as reflected in oxidized cores. Coarse wares typically exhibit a dark core due to the lower firing temperatures needed to prevent decomposition of the limestone temper. Handles (including the horizontal cylinder handle), “turtle flipper” lugs, and rim forms match those described by Lee (1980) (see also, Allworth-Jones 2008). These attributes are consistent with DeWolf’s (1953) description of the Little River phase (see Allsworth-Jones 2008; Lee 1980). The diversity observed may reflect experimentation with different clay sources and tempers.

The pottery at Sweetwater is better made; all of the sherds have well-smoothed interior and exterior surfaces, and breaks follow coil lines. Using the same criteria as was used for the Paradise pottery, it all would be considered fine ware. The pottery ranges in color from red/brown (most common) to black, and was fired in a more reducing environment. There are no light or buff color sherds. Sherds range in thickness from 5-10 mm. Griddles are not common, and also have a fine mineral paste with smoothed surfaces (see **Appendix Figure A3-7**, top left). Red painting is absent, and all of the modes fall within the Montego Bay variety of the White Marl phase.

Of special note are the agate(?) ear spool and greenstone dog zemi pendant from the Paradise site. Olive shell beads and tinklers, nacreous inlays, along with small stone and shell disc beads were found at both sites but in very small numbers.

The only structural feature at either site were two possible post stains at the Paradise site, but efforts to find associated stains were unsuccessful. Given the swampy conditions it is possible that houses were built on stilts, like those at Los Buchillones site in Cuba (Pendergast et al. 2002). This would account for the very large stain in Unit A, and the absence of smaller wall post stains. Given the narrow width of the dune, multiple houses at both Paradise Park sites would have to have been aligned along the dune, as is the case in The Bahamas (Keegan 1997). This community plan contrasts the more circular, oval, or grid-plan settlements observed elsewhere in the Late Ceramic Age.

Cultural Interactions

Paradise is the only site in Jamaica with evidence of mixed cultural assemblages. Sherds with diagnostic, White Marl phase incision and fillet rim were recovered from Level 1 (0-10 cmbs) in Area 400 (**Figure 19**). These sherds look identical to pottery from the Sweetwater site; an impression confirmed by examination under a microscope. In addition, several possible Redware sherds were found in the Sweetwater assemblage (see **Appendix Figures A3-5 and A3-7**). A more detailed analysis of pottery from both sites in underway. One goal is to look for additional evidence of mixed pottery assemblages.

A charcoal sample from Unit E, Level 1 (at 7 cmbs) was submitted for AMS dating in an effort to determine when this mixing may have occurred (Beta-620131; see **Table 1**). Unfortunately, the sample returned a historic date (cal AD 1802-1936), which was not entirely unexpected given activities in the area continuing to the present. A small number of historic artifacts were recovered during excavations, including a possible barrel hoop (Unit 400C at 20 cmbs). A second AMS date of Cal AD 1312-1428 (Beta-620134; see **Table 1**) from deeper in the deposit (at 29 cmbs) raises the possibility that people were living at the Paradise site when the Sweetwater site was occupied. The variety of these sherds is consistent with interactions, and a few Redware sherds were observed in the preliminary examination of pottery from the Sweetwater site. There is no reason for Redware people to disappear. All we see is a change in pottery making following the arrival of White Marl people. It is hard to believe that this change occurred without interactions between them.

Nevertheless, it also is possible that people from Sweetwater used this area after the Paradise site was abandoned. Abandoned sites have organically enriched soils, especially midden deposits, which are favorably compared to composting (Keegan and Hofman 2017:91-92) and are associated with *terra preta* soils in Amazonia (Neves et al. 2004). In addition, old gardens often have fruit trees and other valuable plants (e.g., there is a stand of river cane

[*Arundinaria gigantea*] near the Sweetwater site whose smooth bamboo shafts are used to make arrows), and it is easier to establish new gardens in previously cleared, secondary growth, than in primary forest. In sum, the Paradise site would have been attractive even if it had long been abandoned. It is possible that gardens were established in this area, and the small quantity of Sweetwater pottery found here is associated with a farmstead. A more comprehensive examination of the pottery from both sites is needed to address the question of why Sweetwater sherds were found at the Paradise site.

Figure 19. Mixed collection of pottery from the Paradise site (Area 400, level 1). Redware sherds (left); White Marl phase sherds (right).

Conclusions: Broader Contexts

In conclusion, I want to briefly place these sites in their wider Jamaican and Caribbean contexts. You may have noticed that I used the Jamaican pottery names. I prefer Redware (or Little River) and White Marl/Montego Bay/Morant Bay to Rouse's Ostionan and Meillacan subseries (1992). Some investigators use the broader terms to conclude they know more about Indigenous history than they actually do. In other words, classifying Redware pottery with Puerto Rican Ostiones does not mean the Indigenous peoples were the same; all we really know is that they made similar kinds of pottery. Going forward, we need a greater focus on local styles and local assemblages to advance our understanding of cultural diversity in Jamaica and throughout the Caribbean.

When I first came to Jamaica to do archaeology one of the main issues concerned the transition from Redware to White Marl. The reason this was an issue is because Rouse's culture history posited a transition from Ostionoid to Meillacoid. He later subsumed both pottery series as subseries of Ostionoid to reaffirm his belief in a singular line of development (Rouse 1992). Thus, Ostionan Ostionoid begat Meillacan Ostionoid. If a smooth transition in decorative styles did occur, and I'm not convinced it did without substantial influence from peoples living in western and central Venezuela (Ross et al. 2020), then it occurred about AD 700-800 in the Cibao Valley of central Hispaniola (Keegan and Hofman 2017:125). Therefore, we should not expect to observe a "series" transition in Jamaica. There is no way a transition in pottery styles from Ostionoid into Meillacoid occurred in exactly the same ways in Hispaniola and Jamaica. Redware people did not suddenly wake up one morning and start making White Marl pottery. What we observe is a complete replacement. A change that must have involved interactions between these two distinct cultures.

We need to look at more specific attributes ("modes") and then track how these are distributed in different sites. The style descriptions for Jamaica are not sufficiently robust to address the relationships between Redware and White Marl, let alone the relationships these styles represent. For example, rather than elevating Montego Bay and Morant Bay pottery to the level of Style (Allsworth-Jones et al. 2007), it may be better to think of each as a "variety" of the White Marl "phase" (Howard 1956; compare Gifford 1960 to Rouse 1960).

My explanation for the historical sequence is that Ostionoid, broadly speaking, reflects the increased use of pottery by Archaic Age peoples (Keegan 2006, 2019). Pottery was made by Archaic Age peoples in Cuba, in small quantities, for 2,000 years before the advent of the Ceramic Age (Rodríguez Ramos et al. 2008). The advantage that pottery offered was the more efficient preparation of heated liquids. Two types of comestibles obtained first through exchange with the newly arrived Ceramic Age peoples of Puerto Rico, likely encouraged them to make greater use of pottery vessels. One is the preparation of maize as porridge, which has proved to be an amazing weaning food that has substantially reduced infant mortality around the world. The other is the preparation of alcoholic beverages from maize and manioc. If these were previously unknown, I would expect their rapid adoption and a concomitant increase in the use of pots.

Whether or not the increasing use of pottery represents the next stage of Archaic development or the next wave of Ceramic Age expansion from the east, is not important. What is important is that Ostionoid peoples were the equivalent of frontiersman, the first wave of expansion into the previously unoccupied islands of Jamaica and the Bahamas. They settled along the coast and exploited a pristine fauna -- including sea turtles, iguanas, bush and ground nesting birds, and untouched fisheries (Keegan and Hofman 2017). They lived in small groups, and when the best resources in an area were depleted, they moved on to new virgin territory. The Paradise site fits this scenario. It's 400 meter length probably does not reflect a single occupation, but multiple episodes of abandonment and reoccupation. We see exactly the same pattern in the Bahama archipelago.

The Redware peoples were followed within a few hundred years by a new wave of immigrants, probably from Hispaniola (below). This Meillacoid migration was effected by larger, more sedentary farming communities. In the Dominican Republic there was at least an initial preference for mangrove habitats (Veloz Maggiolo et al. 1981), like the situation at Paradise Park. Over time, Meillacoid settlements were increasingly located on hilltops above the coastal plains of Hispaniola, Cuba, and Jamaica. The sites in the hills above Kingston are an excellent example. While hutia dominate the faunal assemblages at the sites near Kingston, the Sweetwater site reflects an emphasis on marine resources. Because the site was occupied until after the arrival of European rats, we see a long-standing, complementary settlement pattern in which some communities were located to take advantage of agricultural land and defensive positions, while others produced marine foods possibly for exchange (and living in a swamp provides its own defensive advantages). I mention defense because tribal societies around the world are in a near constant state of warfare (Redmond 1994), albeit not the type of conquest warfare practiced by modern States.

The origins of both Little River and White Marl, and their relationship to each other, remain a mystery. We have conjectures, but lack solid evidence. Human biology may finally provide a robust answer. With regard to White Marl, a study of Indigenous facial morphology recognized that individuals from Jamaica, Hispaniola, and the Bahamas formed a single cluster that differed from both Puerto Rico and Archaic Age Cuba (Ross et al. 2020). In other words, people belonging to a particular cluster would have looked different from the others. Facial morphology has an underlying genetic component so these differences merit further investigation with genetic analysis. The one thing

Hispaniola, Jamaica, and the Bahamas had in common was Meillacoid pottery, which was interpreted as evidence for a migration to Hispaniola by Caribs from western South America beginning about AD 500. Meillacoid pottery is significantly different from Ostionoid pottery, and it suddenly appeared in Hispaniola with a distinct set of motifs executed as parallel-line incisions, appliqué, punctations, and built adornos. It closely resembles pottery associated with South American Caribs and its appearance in Hispaniola occurred at the same time Caribs were expanding their territory in South America (Lathrap 1970).

The analysis of Indigenous DNA should provide some answers. A recent genome-wide study of Indigenous Caribbean DNA found that all of the Ceramic Age peoples who colonized the Caribbean Islands exhibit a remarkable degree of genetic homogeneity (Fernandes et al. 2021). Thus, there appears to have been only one Ceramic Age migration from South America, and that there was no genetic evidence for our proposed Carib migration. Nevertheless, there is genetic substructure within the islands. For example, the only two samples from a Meillacoid site (Diale 1 in Haiti) show evidence for substantial admixture with the preceding Archaic Age peoples occurred about the time that Jamaica was first settled. In addition, The Bahamas and Ceramic Age Cuba form a subclade, as does the Southeast coast of the Dominican Republic, both of which probably resulted from bottlenecks in the transmission of genetic materials at their points of origin. A similar bottleneck can be expected for Jamaica. The largest gaps in the DNA data are Jamaica and Haiti. We can't hope to understand biological relationships in the western Caribbean without samples from these countries. Genome-wide and haplogroup data from both are essential to decipher relationships between the islands. For example, although the Bahamas are characterized by a single subclade, there is mitochondrial DNA evidence for the movement of people into the Bahamas from primarily Hispaniola but also from Cuba (Forbes-Pateman et al. 2022). Examining individuals from Redware and White Marl populations should provide evidence for where they came from, how they interacted, and why the later replaced the former.

Finally, it is imperative for archaeologists to disseminate their work to the public (**Figure 21)**. We were fortunate to have visits from the Paradise Park Preparatory School, and Jamaica's Tourist Product Development Company (TPDCO). I have learned so much from being asked what people prefaced as "stupid" questions, but which I then couldn't answer. They are a constant reminder that there is much to this world that we still don't understand. For example, while working at Sweetwater I noticed the director of the TPDCO staring at the nearby Ceiba tree. When I asked what she was looking at she said that the tree was "smoking." Indeed, the crown of the tree seemed shrouded in smoke, despite the clear beautiful day. I moved closer to investigate worried that we had somehow set the forest on fire, but could not find any explanation. It was at that moment I understood a duppy, or perhaps a Taíno opía, was scrutinizing our work. Fortunately, it did not throw heat.

Figure 21. School children from the Paradise Park Preparatory School visiting the site.

Acknowledgements: *I owe a great debt to the late Tony Clarke and his son Eric ("Busha") for their unwavering support. The project would not have been possible had they not opened their farm to us and provided logistical and moral support. This chapter is dedicated to Tony (**left**).*

Our collaboration with Jamaica National Heritage Trust archaeologists was essential. Special thanks to Roderick Ebanks (then JNHT archaeology director), Dorrick Gray, Selvenious "Spider" Walters, Lesley-Gail Atkinson, and Audene Brooks. Ricardo Tyndall was a joy and our go-to guy for everything Jamaican (his passing at such a young age is a tragedy). Dr. Philip Allsworth-Jones brought students from UWI-Mona to work with us on three occasions over the years. Betsy Carlson, as always, proved essential in getting the project started. UF graduate students Micah Mones and Sharyn O'Day helped supervise field and lab activities, which was no small feat given as many as 20 people on site at any given time. The assistance of Earthwatch volunteers (too many to acknowledge individually) and especially the "Keeganites" (Jean Borchart, Ben Castricone, Sylvia Chappell, Michael Dion, Bob Gezon, Terry Hines, Ralph and Mary Lou Pax, Warren Stortreon, and Patti Yamane) is gratefully acknowledged. Lorie, Dan, Lindsay, and Caroline Keegan also assisted in the excavations. My only regret is that Ms. Barbados and Ms. Jamaica never agreed on whether it was "rice and peas" or "peas and rice"! Finally, Dr. Lindsay Bloch (FM Collection Manager for Ceramic Technology) was a tremendous help with the preliminary pottery analysis. Special thanks to Betsy Carlson and Emily Lundberg for offering their opinions on the proper classification of Redware, and for comments that improved the final version.

References

Allsworth-Jones, P., 2008. *Pre-Columbian Jamaica*. Tuscaloosa: University of Alabama Press.

Allsworth-Jones, P., Bogle-Douglas, M., and Wesler. K.W., 2007. Defining the Montego Bay Style: A re-consideration of R. L. Vanderwal's work in Jamaica. Paper presented at the XXI Congress of the International Association for Caribbean Archaeology, University of the West Indies, St. Augustine, Trinidad.

Allsworth-Jones P., and Wesler, K.W., 2012. *The Taíno settlement at Guayguata: Excavations in St. Mary's Parish, Jamaica*. Oxford: British Archaeological Reports International Series.

Atkinson, L.G., 2006a. The exploitation and transformation of Jamaica's natural vegetation. *The earliest inhabitants: the dynamics of the Jamaican Taíno.* edited by L-G. Atkinson, pp.97-112. Kingston: University of the West Indies Press.

Atkinson, L.G., 2006b. *The earliest inhabitants: The dynamics of the Jamaican Taino*. Kingston: University of the West Indies Press.

Beeker, C.D., Conrad, G.W. and Foster, J.W., 2002. Taíno use of flooded caverns in the East

National Park region, Dominican Republic. *Journal of Caribbean Archaeology*, *3*, pp.1-26.

Carlson, L.A., 1999. *Aftermath of a feast: human colonization of the southern Bahamian Archipelago and its effects on the indigenous fauna*. PhD dissertation, University of Florida, Gainesville.

Ciofalo, A.J., Keegan, W.F., Pateman, M.P., Pagán-Jiménez, J.R. and Hofman, C.L., 2018. Determining precolonial botanical foodways: starch recovery and analysis, Long Island, The Bahamas. *Journal of Archaeological Science: Reports*, *21*, pp.305-317.

Conrad, G.W., Foster, J.W. and Beeker, C.D., 2001. Organic artifacts from the Manantial de la Aleta, Dominican Republic: preliminary observations and interpretations. *Journal of Caribbean Archaeology*, *2*, pp.1-20.

DeWolf, M., 1953. Excavations in Jamaica. *American Antiquity*, *18*(3), pp.230-238.

DiNapoli, R.J., Fitzpatrick, S.M., Napolitano, M.F., Rick, T.C., Stone, J.H. and Jew, N.P., 2021. Marine reservoir corrections for the Caribbean demonstrate high intra-and inter-island variability in local reservoir offsets. *Quaternary Geochronology*, *61*, p.101126.

Ebanks, R., 1992. *Paradise Park Amerindian (Arawak Indian) site at Paradise Park: A report of site survey and test excavations*. Heritage Business Associates, Spanish Town, Jamaica.

Espenshade, C.T., 2000. Reconstructing household vessel assemblages and site duration at an early Ostionoid site from south-central Puerto Rico. *Journal of Caribbean Archaeology*, *1*(1), pp.1-22.

Fernandes, D.M., Sirak, K.A., Ringbauer, H., Sedig, J., Rohland, N., Cheronet, O., Mah, M., Mallick, S., Olalde, I., Culleton, B.J. and Adamski, N., Bernardos, R., Bravo, G., Broomandkhoshbacht, N., Callan, K., Candilio, F., Demetz, L., Duffett Carlson, K.S., Eccles, L., Freilich, S., George, R.J., Lawson, A.M., Mandl, K., Marzaioli, F., McCool, W.C., Oppenheimer, J., Özdogan, K.T., Schattke, C., Schmidt, R., Stewardson, K., Terrasi, F., Falzala, F., Arredondo Antúnez, C., Vento Canosa, E., Colten, R., Andrea Cucina, A., Genchi, F., Kraan, C., La Pastina, F., Lucci, M., Veloz Maggiolo, M., Marcheco-Teruel, B., Tavarez Maria, C., Christian Martínez, C., París, I., Pateman, M., Simms, T.M., Garcia Sivoli, C., Vilar, M., Kennett, D.J., Keegan, W.F., Coppa, A., Lipson, M., Pinhasi, R., and Reich, D., 2021. A genetic history of the pre-contact Caribbean. Nature, 590, pp.103-110.

Forbes-Pateman, V., Yardumian, A., Vilar, M., Simms, T.M., Pateman, M.P. and Keegan, W., A population history of indigenous Bahamian islanders: Insights from ancient DNA. *American Journal of Biological Anthropology*, **https://doi.org/10.1002/ajpa.24488**.

Gifford, J.C., 1960. The type-variety method of ceramic classification as an indicator of cultural phenomena. *American Antiquity*, *25*(3), pp.341-347.

Goodwin, R.C. and Walker, J.B., 1975. *Villa Taina de Boqueron: The excavation of an early Taino site in Puerto Rico*. Inter American University Press.

Howard, R.R., 1956. The archaeology of Jamaica: a preliminary survey. *American Antiquity*, *22*(1), pp.45-59.

Jackson, J.B.C., 1973. The ecology of the molluscs of *Thalassia* com- munities, Jamaica, West Indies. I. Distribution, environmental physiology, and ecology of common shallow-water species, *Bulletin of Marine Science* 23, pp. 313–350.

Keegan, W.F., 1986. The ecology of Lucayan Arawak fishing practices. *American Antiquity*, *51*(4), pp. 816-825.

Keegan, W.F., 1997. *Bahamian archaeology*. Nassau: Media Publishing.

Keegan, W.F., 2006. Archaic influences in the origins and development of Taino societies. *Caribbean Journal of Science*, *42*, pp. 1-10.

Keegan, W.F., 2019. Situating Jamaica. In *Early settlers of the insular Caribbean: Dearchaizing the Archaic*, edited by C.L. Hofman and A.T. Antczak, pp. 191-199. Leiden: Sidestone Press.

Keegan, W. F., and Atkinson, L.-G., 2006. The development of Jamaican prehistory. In *The earliest inhabitants: The dynamics of the Jamaican Taíno*, edited by L.-G. Atkinson, pp. 13–33. Kingston, Jamaica: University of the West Indies Press.

Keegan, W.F., and Carlson, L.A., 2008. The Chip-Chip Gatherers. In *Talking Taino: Caribbean Natural History from a Native Perspective*, pp. 61-65. Tuscaloosa: Alabama University Press.

Keegan, W.F., Carlson, L.A., Delancy, K.M. and Hayes, D., 2018. A Crab-Shell dichotomy encore: Visualizing Saladoid shell tools. *Journal of Caribbean Archaeology*, *18*, p.1.

Keegan, W.F., Carlson, L.A., Delancy, K.M. and Hayes, D., 2019. Child labor in Saladoid St. Thomas, USVI (300–500 CE). *Journal of Anthropological Archaeology*, *53*, pp.222-228.

Keegan, W.F. and Hofman, C.L., 2017. *The Caribbean before Columbus*. New York: Oxford University Press.

Keegan, W.F., Pateman, M.P., LeFebvre, M.J., Carlson, L.A. and Portell, R.W., 2020. Cooking with corals: The Bahamas experiments. *Journal of Archaeological Science: Reports*, *33*, https://doi.org/10.1016/j.jasrep.2020.102472.

Keegan, W.F., Portell, R., and Slapsinsky, J., 2003. Changes in invertebrate taxa at two pre-Columbian sites in southwestern Jamaica. *Journal of Archaeological Science*, 30, pp. 1607–1617.

Lathrap, D.W., 1970. *The upper Amazon*. Southampton: Thames & Hudson.

Lee, J.W., 1980. Jamaican Redware. In *Proceedings of the Eighth International Congress for the Study of the Pre-Columbian Cultures of the Lesser Antilles*, edited by S.M. Lewenstein, pp. 597-609. Anthropological Research Papers No. 22, Arizona State University.

Neves, E.G., Petersen, J.B., Bartone, R.N. and Heckenberger, M.J., 2004. The timing of terra preta formation in the central Amazon: archaeological data from three sites. In *Amazonian dark earths: explorations in space and time*, pp. 125-134., Berlin: Springer

Palmer, R., 1989. *Deep into blue holes: The story of the Andros Project*. London: Unwin Hyman.

Pendergast, D.M., Graham, E., Calvera, R.J. and Jardines, M.J., 2002. The houses in which they dwelt: the excavation and dating of Taino wooden structures at Los Buchillones, Cuba. *Journal of Wetland Archaeology*, *2*(1), pp.61-75.

Redmond, E.M., 1994. *Tribal and chiefly warfare in South America* (Vol. 28). Ann Arbor: University of Michigan Museum.

Rodríguez Ramos, R., Babilonia, E., Curet, L.A. and Ulloa, J., 2008. The pre-Arawak pottery horizon in the Antilles: A new approximation. *Latin American Antiquity*, *19*(1), pp.47-63.

Ross, A.H., Keegan, W.F., Pateman, M.P. and Young, C.B., 2020. Faces divulge the origins of Caribbean prehistoric inhabitants. *Scientific Reports*, *10*(1), pp.1-9.

Rouse, I., 1960. The classification of artifacts in archaeology. *American antiquity*, *25*(3), pp.313-323.

Rouse, I., 1992. *The Tainos: rise and decline of the people who greeted Columbus*. New Haven: Yale University Press.

Rye, O.S., 1976. Keeping your temper under control: materials and the manufacture of Papuan pottery. *Archaeology & Physical Anthropology in Oceania*, *11*(2), pp.106-137.

Scudder, S., 2006. Early Arawak subsistence strategies: the Rodney's House site of Jamaica. In *The earliest inhabitants: The dynamics of the Jamaican Taíno*, edited by L-G. Atkinson, pp.113-128. Kingston: University of the West Indies Press.

Thoms, A.V., 2008. The fire stones carry: ethnographic records and archaeological expectations for hot-rock cookery in western North America. *Journal of Anthropological Archaeology*, 27, pp. 443-460.

Vanderwal, R., 1968. *The prehistory of Jamaica: A ceramic study*. Master's thesis, University of Wisconsin-Milwaukee.

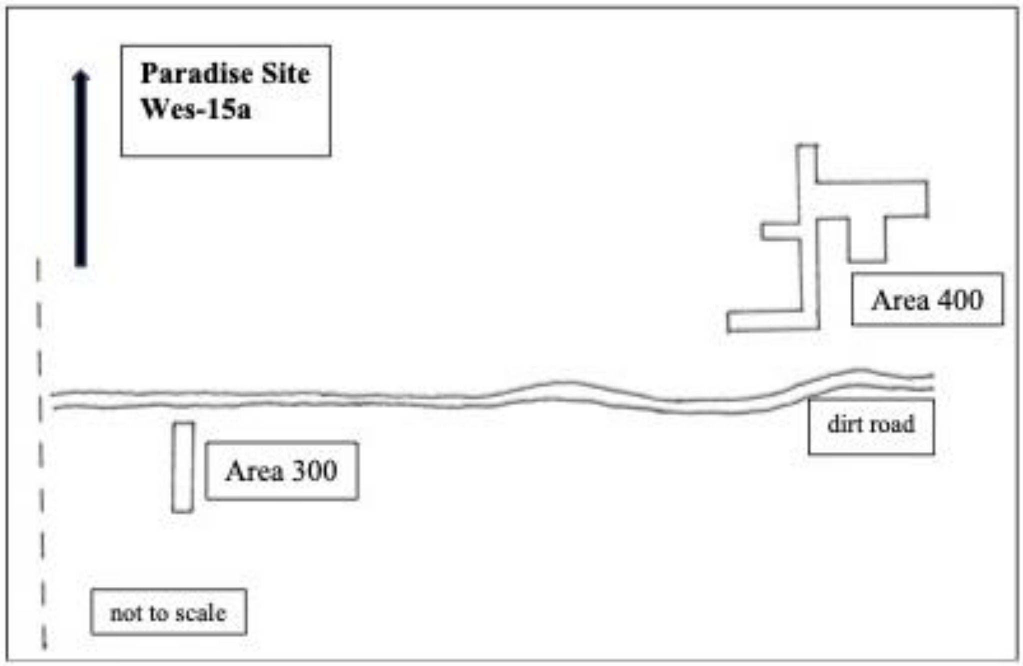
Veloz Maggiolo, M., Ortega, E., and Caba Fuentes, A., 1981. *Los modos de vida Meillacoides y sus posibles origenes*. Santo Domingo: Museo del Hombre Dominicano.

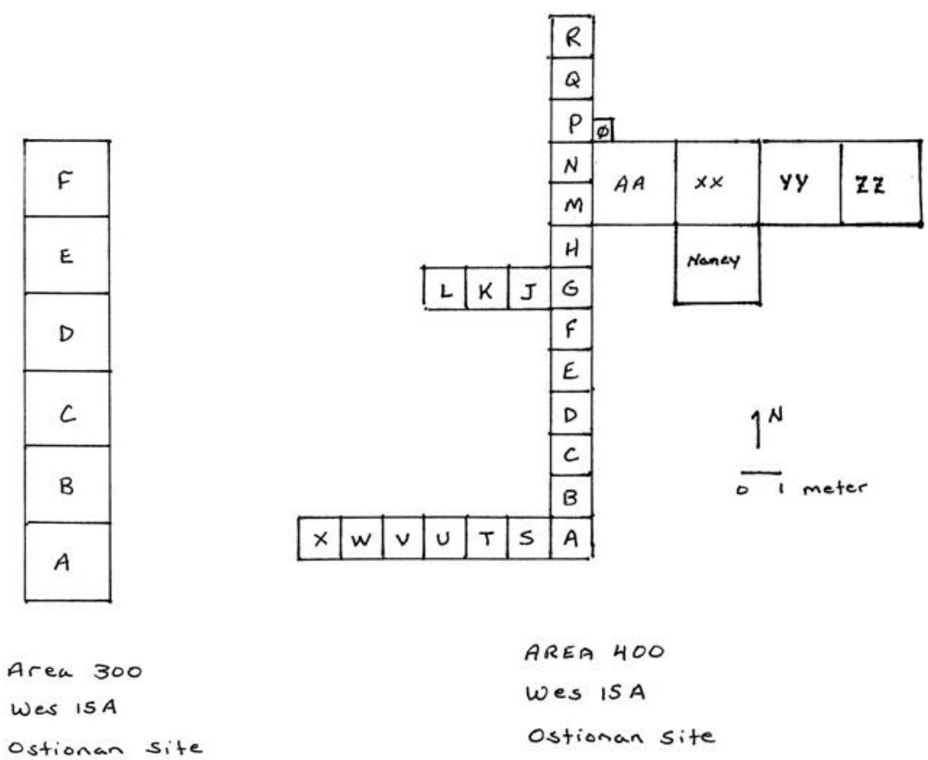
Voorhies, B., and Gose, W.A., 2007. Stone boiling technology at a Middle Archaic Period site of southwest coastal Mexico. In *Archaeology, Art, and Ethnogenesis in Mesoamerican Prehistory: Papers in Honor of Gareth W. Lowe*, edited by L. S. Lowe and M. E. Pye, pp. 43-61. Papers of the New World Archaeological Foundation, Number 68. Provo: Brigham Young University.

Wesler, K., 2013. Jamaica. In *The Oxford handbook of Caribbean archaeology*, edited by W. F. Keegan, C. L. Hofman, and R. Rodríguez Ramos, pp. 250–263. New York: Oxford University Press.

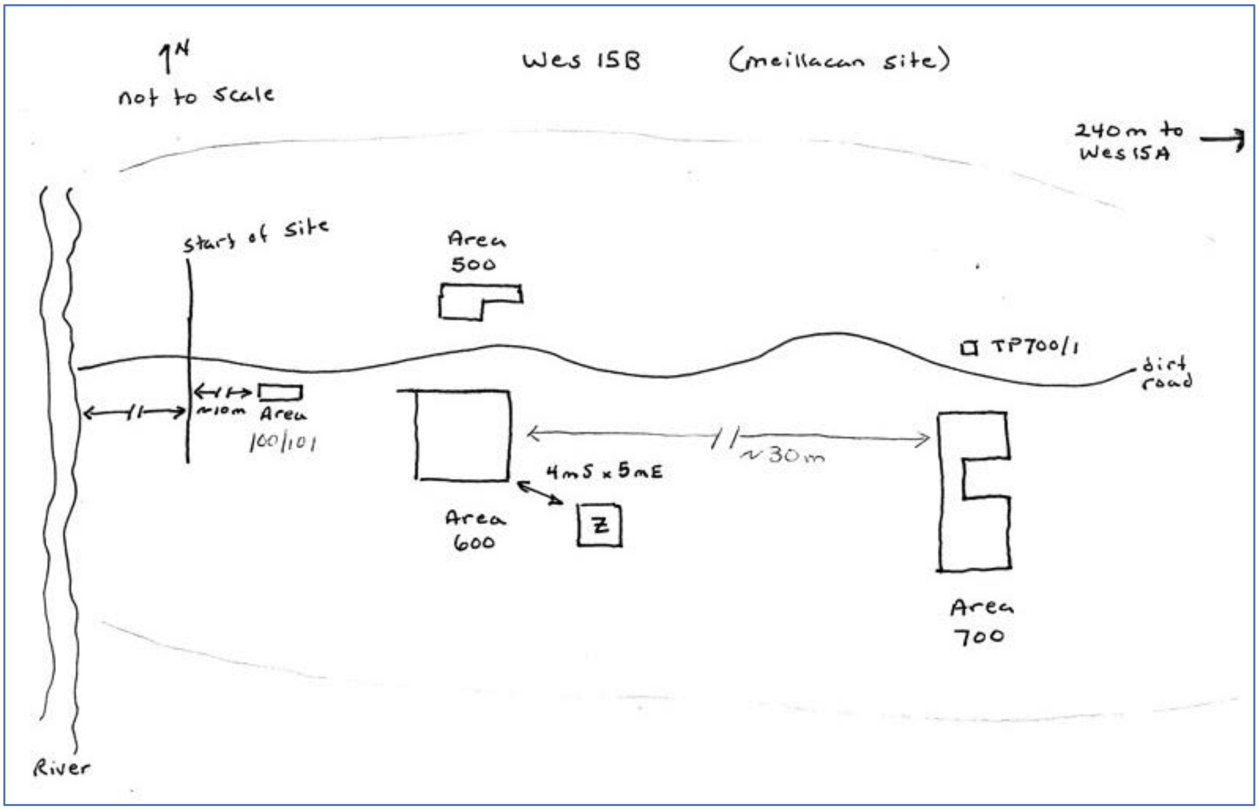
Appendix 1. Field Maps

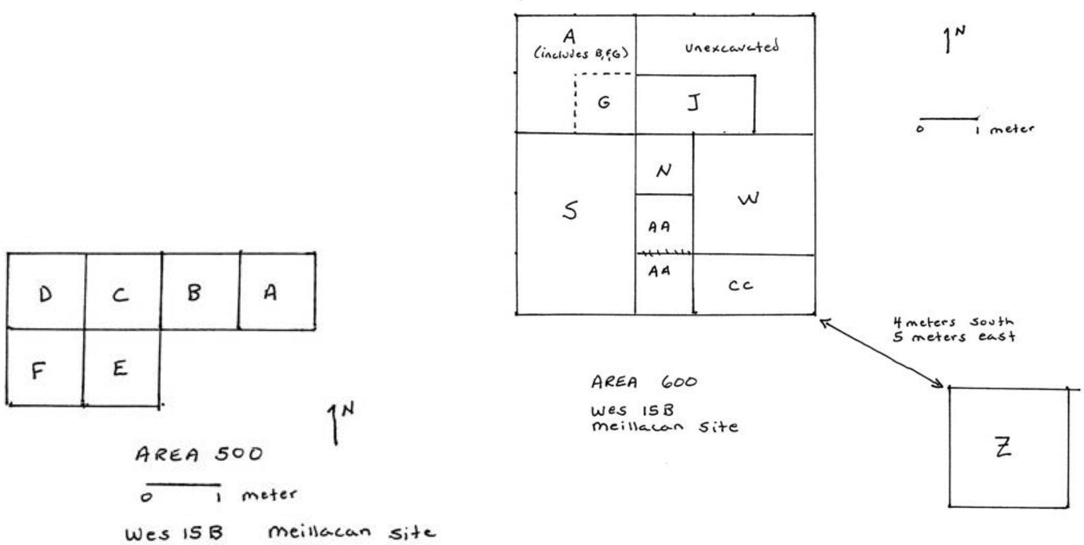
A. Paradise site (Wes-15b)

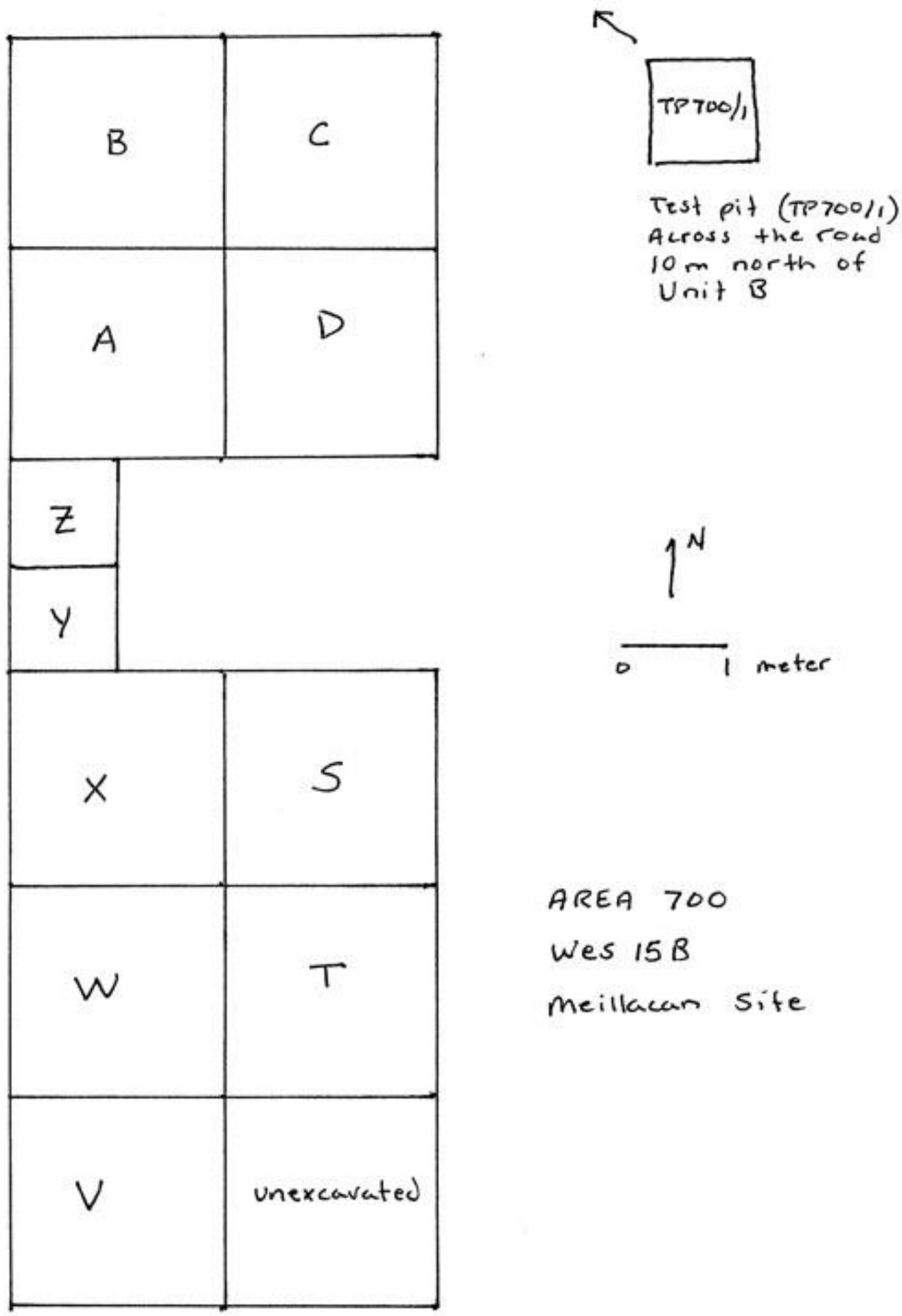




B. Sweetwater site (Wes-15a)






B
C
A
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Z
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X
S
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T
V
unexcavated
TP700/1
Test pit (TP700/1)
Across the road
10 m north of
Unit B
N
0 1 meter
AREA 700
Wes 15B
Meillacan Site

Appendix 2: Representative and decorated pottery from the Paradise Site.

A. Area 400, Unit XX, by level.

Figure A2-A1: Level 1, 0-10 cmbs. Clockwise from bottom left: Smoothed Redware flat rim; incurved bowl; light paste sherd; base of round bottom bowl; 2 griddle sherds; two strap handles; (middle) black sherd (checkerboard pattern caused by drying on a window screen).

Figure A2-A2: Level 2, 10-20 cmbs. Clockwise from bottom left: Redware rim; incised flipper-like lug; button lug with incision on either side; small handle; thick griddle sherd (32.3 mm); narrow handle; light paste, fillet rim (White Marl phase); very thin dark sherd.

Figure A2-A3. Level 3, 20-30 cmbs. Clockwise from bottom left: Flat base; smudged exterior; strap handle; red-painted lug ("turtle flipper"); two griddle sherds; light color coarse paste.

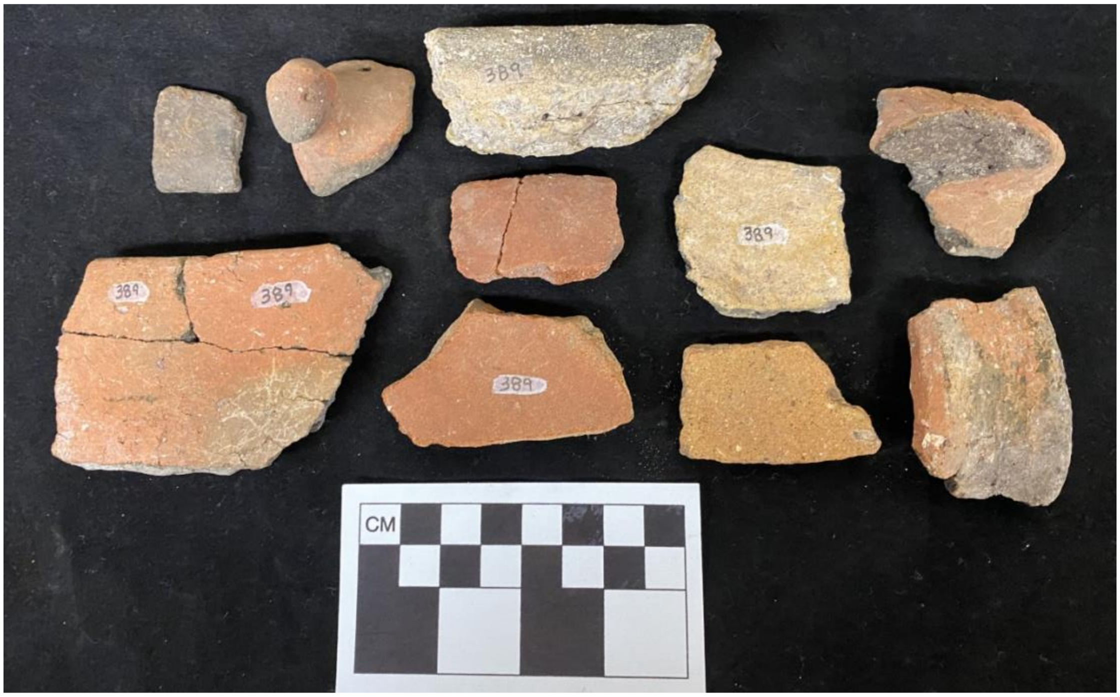

Figure A2-A4. Level 4, 30-40 cmbs. Clockwise from bottom left: Redware with unpainted surface (lower right of sherd); black, thin sherd; anthropomorphic lug; thick light grey griddle (26.8 mm); Redware with black smudge; saddle-shaped handle; middle 4 show range of paste colors.

Figure A2-A5. Level 5, 40-50 cmbs. Clockwise from bottom left: Smooth grey sherd; griddle with raised rim; small beige paste bowl; griddle with coil fracture; broken handle attachment; thin, smooth Redware (center).

Figure A2-A6. Level 6, 50-60 cmbs. Clockwise from left: Light color paste; griddle; interior residue; cylindrical handle; polished red sherd; polished black sherd.

B. Pottery from Area 400, neighboring units.

Figure A2-B1. Unit XX. From left: Light paste griddle; light paste bowl with flat bottom; smoothed Redware; light color paste with smudging.

Figure A2-B2. Unit Nancy, level 1, 10-20 cmbs. Typical Redware sherds.

Figure A2-B3. Unit Nancy, level 1, 10-20 cmbs. Coarse ware (Type 1) strap handle from a boat-shaped vessel. The strap was flattened prior to firing.

Figure A2-B4. Area 400, level 1, 10-20 cmbs. Horizontal handle with incised nubbins

Figure A2-B5. Unit N, Level 3, 40-50 cmbs. Clockwise from bottom left: Appliqué lug; tan color foot/lug; smoothed Redware inturned vessel.

Figure A2-B6. Unit P, Level 3, 40-50 cmbs. Clockwise from bottom left: Smooth disc; flipper lug; pointed eye with eyebrow; strap handle.

Appendix 3: Representative and decorated pottery from the Paradise Site.

A. Area 600, Unit A, by level.

Figure A3-1. Level 1, 0-10 cmbs. Clockwise from bottom left: Light paste with smudging and fillet rim; red paste fillet rim; in-turn at shoulder with beveled rim; thick coarse griddle; and (center) light paste with red paint.

Figure A3-2. Level 2, 10-20 cmbs. Clockwise from bottom left: Reduce fired fillet rim; two fillet rims; large fine ware body sherd; two red paste sherds; body sherd with smudging.

Figure A3-33. Level 3, 20-30 cmbs. Clockwise from bottom left: grey paste out-turned fillet rim; oxidized paste, sharp inturn; incised appliqué nubbin; reduce and oxidize sherds with limestone caliche adhering to surface; light paste sherd.

Figure A3-4. Level 4, 40-50 cmbs. (top) shaped sherd; fillet rim; tapered rim; large griddle sherd; (middle) beveled rim; incised rim; fillet rim; (bottom) incised appliqué nubbin; reduce fired fillet rim; red paste sherd.

Figure A3-5. Level 5, 50-60 cmbs. (bottom left) three incised sherds; and grey paste with dark core (possible Redware); (top left) black smudged; platter with incised coil wrapped over rim

Figure A3-6. Close up of incised coil wrapped over rim of platter (Level 5, 50-60 cmbs).

Figure A3-7. Various Sweetwater motifs. Clockwise from bottom left: two incised appliqués; thick raised-rim griddle with smudging; incised appliqué below fillet rim; small, Redware loop handle with pointed top; rough incising; complicated incised appliqué below fillet rim; very fine incised appliqué.

Appendix 4. Red surface treatments on Little River style pottery from the Paradise Site.

It has been noted that "Redware" is something of a misnomer because it has been estimated that only about 10% of the sherds are "red painted" (see Lee 1980). In order to obtain a more accurate estimate (i.e., based on a larger sample), sherds from Area 400, Unit XX were sorted according to paste type (Coarse ware and Fine ware) and surface treatment (Red-color surface) by level (Tables A4.1 and A4.2). Coarse ware comprises an average of 7% by count and 12% by weight (including griddles which account for only 1% of the total). Thus, Fine ware (including red surface treatment) accounts for 93% by count and 88% by weight of the total sample. *All of the sherds with red surface treatments have fine ware pastes* (see "Paradise Variety paste types, p. 13).

A red surface color was observed on 22% of the sherds (Tables A4.1 and A4.2). My goal during sorting was to employ an easily replicable category that I call – "red surface treatment." I do so because I was unable to determine from a visual inspection alone whether the red color was produced by painting, slipping, polishing, firing, or some combination. What is clear is that a specific effort was made to make the vessel look red. Although it should be noted that both surfaces of some sherds are completely red, while others have only partial coverage, including coloration of only the interior, or only the exterior, surfaces. Only sherds with a discernable red surface layer were counted. There are a small number of completely oxidized sherds, red throughout, but these were not counted as surface treated. Unit XX provides a complete stratigraphic sequence of 10 cm levels.

Table A4.1. Counts of sherds from Area 400, Unit XX, by level.

Level	Coarse ware	Fine ware	Red surface	Total	% Red surface
1	5	63	20	88	23
2	12	96	25	133	19
3	11	149	47	207	23
4	19	172	35	226	16
5	24	214	83	321	25
6	12	90	35	137	26
7	7	18	14	39	36
				1,151	Average = 22%

Table A4.2. Weights of sherds from Area 400, Unit XX, by level.

Level	Coarse ware	Fine ware	Red surface	Total	% Red surface
1	54	346	149	549	27
2	123	533	159	815	16
3	295	827	274	1,396	20
4	211	951	220	1,382	16
5	377	1053	586	2,016	29
6	109	455	243	807	30
7	36	104	46	186	25
				7,151	Average = 23%